The iTHEPHY project and its software platform

Enhancing remote teacher-student collaboration
Agenda

01 iTHEPHY EU funded Project
   Originating idea and project development

02 ISHEP Cargese school and TANDEM Project
   Practical implementation

03 IaaS ICT e-learning platform
   ICT infrastructure

04 PaaS migration and software maintenance
   New ideas for next steps
Project funded by the European Community / AGENZIA NAZIONALE INDIRE
Budget: 368990 euro - Coordinator: UNIBO - PI: Angelo Carbone

Who is funded?
- universities
- research Institutions
- industries

Aim?
- improve the teaching quality
- increase the collaboration among European institutions
- promote the usage of information technologies tools
- ensure education and research are mutually reinforcing
- promote internationalization and mobility

KA2 - Cooperation for Innovation and the Exchange of Good Practices
KA203 - Strategic Partnerships for Higher Education

CHEP 2019, Adelaide
The idea to apply for this project started after 3 years of collaboration between Bologna, the University of Dortmund and the University of Clermont-Auvergne.

Three editions (2015/16/17) of the ISHEP spring school (Cargese, Corsica) for students enrolled in the master degree of the three universities (and PhD students)

We also received funding for 15k euro from the Franco-German University for the Spring School and for the 2017 and 2018 editions.

The project is also co-funded (about 20k euro) by the University of Bologna to include non-EU students.

The consortium: a synergy between Universities and research institutions.
iTHEPHY project

Main idea:
- Team of students (2nd year of master degree) from each university to work together to a real research project
- Each team will be supervised by a teacher/researcher from the consortium

Goal:
- Increase the internationalization level of the master degree
- Give to the students team-work skills
- Promote international mobility

The project foresees 3 Intellectual Outputs:
- Guided exercises with solution to be implemented on e-learning platform
  - Exercise with full and partial solutions
- A web-based platform to support the team during the project
  - Video web-conference plugin
  - Chat room
  - Shared area
  - Scheduler/agenda for planning meetings between teachers and students and between students
- A project management tool for tracking projects, assigning sub-tasks and tracking their progress…
- A final document that reports the experience with the aim of replicability of the project in other master degrees (not only in physics)

CHEP 2019, Adelaide
Summer/Spring Schools
(Cargese, Corsica)

We received funds for the organization of two editions of the International School of High Energy Physics (ISHEP)

2018-edition focused on testing the new e-learning materials developed and the new web-based platform

2019-edition dedicated to present results of the teams (tandem). Students and supervisor meet in person to develop the project

Both schools included lectures and seminars

CHEP 2019, Adelaide
Summer/Spring Schools: new models for physics teaching
The idea of the whole project is to allow students to “emulate” what researchers do in their activity *in an international context*. What are the ingredients to perform a research program?

**Project**: an idea which will be developed and transformed in something “real”

**Target**: a starting date and a completion date

**Timeline**: organize a calendar, considering all the intermediate steps, indicating when it’s time to show preliminary results to other colleagues, to your supervisors etc

**Document**: product where you describe the details of your method, what you did and what you obtained

**Present final results** to an international conference: the students have this possibility. It will be the ISHEP school in Cargese…
Tandem project in practice

But the students are not (yet) real researchers! They are (still) students... and by the way this a teaching activity, not a real research, so they need:

- **Supervisors**, which will guide them in the various steps of the project
- **Tools**, which will allow them to communicate, exchange files, material, documents... ideas
- They will not see results published on Nature, but they will see results transformed in ECTS credits, after a formal examination

Last year **16+2 students** were on board:

- 10 from Unibo, 4 from CF, 2 from TUD
- 1 from Colombia and 1 from Russia

2019/2020 is starting right now
Section 3-4

IaaS and PaaS platform
Made with FOSS software

- Moodle
- Moodle-test
- BBB
- Rocket.Chat
- Redmine
- IAM
- ShareLaTeX
- Jitsi
- BigBlueButton

- https://moodle.ithephy.eu
- https://moodle-test.ithephy.eu
- https://redmine.ithephy.eu
- https://sharelatex-test-ithephy.in2p3.fr/login
- https://iam.ithephy.eu
- https://www.ithephy.eu
- https://jitsi.ithephy.eu
- https://bbb.ithephy.eu
iTHEPHY IO1

e-learning and collaborative platform

Moodle

https://docs.moodle.org/35/en/installation_quick_guide

Moodle is a free, online Learning Management System with a big community

Moodle-test

https://docs.moodle.org/37/en/installation_quick_guide

Latest stable for developing and course testing purpose
New theme and innovative plugins

BigBlueButton

http://docs.bigbluebutton.org/2.2/install.html

A video lesson tool with interactive collaboration whiteboard, online chat module and video recording session

Rocket.Chat

https://rocket.chat/docs/installation/docker-containers/

Chat, channel, room, bot, video, audio flexible app
Jitsi is a set of open-source projects that allows you to easily build and deploy secure videoconferencing solutions.


Now Overleaf is an online latex collaborative suite. Edit and compile directly on your web browser.

https://github.com/overleaf/overleaf/wiki/Quick-Start-Guide

A layer where identities, enrollment, group membership and authorization policies can be managed in an homogeneous way.

https://indigo-iam.github.io/docs/current/admin-guide/basic_conf.html

Redmine is a flexible project management web application written using Ruby on Rails framework.

https://www.redmine.org/projects/redmine/wiki/RedmineInstall
RedHat Ovirt on-premise HA

The solidity of the past...Why not on bare-metal?!!!

- The system in production is based on the INFN-BO IaaS service infrastructure based on an Ovirt cluster.
- Bi-processor Xeon multicore storage SAN Fiber-channel.
- The provisioning of resources performed in manual mode with installation via PXE-boot Linux distro and official guide of the application.
- Centos 7-ubuntu 16.04 LTS - docker-compose.
- Hardening so guest with ufw/iptables/app-armor/selinux.
- Ovirt native HighAvailability for Business Continuity.
- Ovirt snapshot and cloning for Disaster Recovery.
- In stable production for 2 years.
- IO1 provides OVA files on a six-monthly basis.

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The above text describes the setup and configuration of a RedHat Ovirt on-premise HA system, detailing the infrastructure, resources, and security measures in place. It emphasizes the importance of maintaining solid foundations in the past and explores the advantages of using bare-metal systems. The text mentions the specifics of the system setup, including the use of INFN-BO IaaS service, Ovirt cluster, and various tools and techniques for managing resources and securing the environment. It highlights the configuration of the system, the use of manuals and guides for installation, and the importance of hardening the guest environment with various security tools and applications. The system's stability and disaster recovery strategies are also discussed, emphasizing the benefits of using Ovirt snapshot and cloning for business continuity and disaster recovery. The text concludes with information on the frequency of providing OVA files for updates and improvements.
Howdy!
Welcome to Rancher

Username: admin
Password: ********

Log In

https://containerjournal.com/topics/container-ecosystems/paas-vs-kaas-a-primer/
Rancher 2.3.1

Openstack resources manually provisioned

Persistent storage with Longhorn software hyperconverged block device using hosts available resources. Necessity of manual configuration of L4 load balancer and security groups on Openstack. Integration of moodle, redmine and rocket.chat with public jitsi. Rancher server run in a cluster node.
Rancher 2.2.9

Openstack instance automatic provision

After the rancher plugin for openstack configuration, every necessary resource from compute node to L4 load balancer and persistent storage resource are automatically provisioned. Resource monitoring and application logging are embedded in rancher resource and service configuration. Rancher server run in a dedicated node.
Monitor & YAML conf

Enabled monitor with Prometheus and Grafana

Some configuration file necessary to plugin configuration
Next Steps (beyond the iTHEPHY IO1)

- Develop and distribute a rancher (k8s too) receipt for every platform deployment
- Consolidate a service for the automatic provisioning of iTHEPHY (iTHERPHY as a Service)
- R&D of new functionalities based on FOSS software (interesting inputs form MALT experience)
- R&D on the new security paradigm applied to k8s and Rancher PaaS/KaaS solution
Conclusions

 ✓ The iTHEPHY project proposes an innovative and an unconventional approach to teaching
   ✓ Based on project-working teaching
   ✓ Complementary to frontal lectures
 ✓ The iTHEPHY promotes internationalization
 ✓ European and non-EU students are involved
 ✓ FOSS software ecosystem
 ✓ Structure IO1 based on virtualization easily to reproduce in house
 ✓ Evolution based on containerization easily interoperable with various private/public provisioning from bare-metal to KaaS
 ✓ If you are interested in replicating this activity in your institute feel free to contact us
Thank you

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